1998–99 CATS ASSESSMENT
Open-Response Item Scoring Worksheet

Grade 4—Science

The **academic expectation** addressed by "Plant Parts" is

2.3 Students identify and analyze systems and the ways their components work together or affect each other.

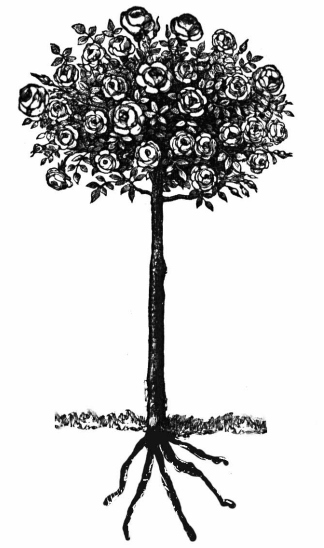
The **core content** assessed by this item includes

Content

- Each plant or animal has structures which serve different functions in growth and survival.
- Organisms have basic needs. For example, animals need air, water, and food; plants require air, water, nutrients, and light. Organisms can survive only in environments in which their needs can be met.

Plant Parts

Look at the picture of the rose plant below.



a. Describe TWO of its parts.

b. Explain what each part does for the plant. Some terms you may want to use are: protection, water, reproduction, energy, and photosynthesis.

SCORING GUIDE
Grade 4 Science

Score	Description
4	The response is complete and shows a solid understanding of the parts of a plant and how they function to help the plant survive. Two parts of the plant (e.g., stem, leaf, etc.) are accurately described and their functions correctly explained in some detail.
3	The response shows an understanding of the parts of a plant and how they function to help the plant survive. Two parts of the plant (e.g., stem, leaf, etc.) are described and the function of one or both parts is generally explained. The response may contain minor errors or misconceptions.
2	The response shows a limited understanding of the parts of a plant and how they function to help the plant survive. There is an attempt to describe two parts of the plant and explain their function. The response may contain errors, misconceptions, or omissions. **OR** One part of the plant is described and the function of that part is clearly or generally explained.
1	The response is incomplete and shows a minimal understanding of the parts of a plant and how they function to help the plant survive. There may be an attempt to describe parts or to explain their functions, but the response contains major errors, misconceptions, or omissions.
0	The response is totally incorrect or irrelevant.
Blank	No response.

Science Behind the Question:

Parts of the rose plant and their functions that might be described include:

Root: Anchors the plant and takes in water and minerals.

Stem: Supports the leaves, transports water and minerals (up to plant) and food (down from leaves). Green stems incorporate some properties of leaves.

Thorns: Add protection against being eaten by larger animals. (Do not protect against insects!)

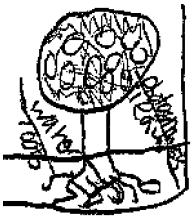
Leaf: Produces glucose (food for the plant) during photosynthesis, using sunlight and air.

Flower: Reproduction. Attracts pollinators and holds components for future seeds.

ANNOTATED STUDENT RESPONSE
Grade 4 Science

Sample 4-Point Response of Student Work

Student Response



Here are two of the rose bush parts and what each part does for the plant. One part is the leaves. The leaves do photosynthesis or get food for the plant. The leaves take in sun and turn it into food. Amazing!

The other part is the roots. These get water for the plant. Since the soil is rich in water, the roots get it and give it to the plant.

Those are two things on the rose bush and what each does for the plant.

← Student accurately describes one part of a rose plant (i.e., leaves) and correctly explains, in some detail, the function of this plant part.

← Student accurately describes a second part of a rose plant (i.e., roots) and correctly explains, in some detail, the function of this plant part.

Overall, the response demonstrates a solid understanding of the parts of a plant and how they function to help the plant survive.

ANNOTATED STUDENT RESPONSE
Grade 4 Science

Sample 4-Point Response of Student Work

Student Response

Two parts of the rose bush are the roots and the thorns.

The roots are thick stems that plants grow under the ground to anchor themselves and the soil. The roots also help the plant absorb the water it needs to live.

Thorns are plant extensions, usually brown, green, or tan. They are sharp as needles. They help protect the plant from animals that might want to eat the plant for food.

For example, roots are like hands that can anchor us. Thorns are like claws that can stick, scratch, and tear things.

← Student accurately describes one part of a rose plant (i.e., roots) and correctly explains, in some detail, the function of this plant part.

← Student accurately describes a second part of a rose plant (i.e., thorns) and correctly explains, in some detail, the function of this plant part.

← Student extends the information provided previously.

Overall, the response demonstrates a solid understanding of the parts of a plant and how they function to help the plant survive.

ANNOTATED STUDENT RESPONSE
Grade 4 Science

Sample 3-Point Response of Student Work

Student Response

I am going to describe the two parts of the rose bush and what they do. The two parts are the roots and the thorns. The roots get water for the plant so it can live. The thorns protect it so it won't get damaged or hurt.

← Student describes two parts of a rose plant (i.e., roots and thorns) and generally describes the function of each.

Overall, the student shows an understanding of the parts of a plant and how they function to help the plant survive.

Sample 2-Point Response of Student Work

Student Response

Here are two parts of a plant. It need protection. It also need energy. For its protection it has got thons on its limbs. It gets its energy from the sunlight. That shines on it.

← Student describes one part of a rose plant (i.e., thorns) and generally explains the function of this plant part.

← Student attempts to explain energy transfer in plants, but does not identify the specific plant part that interacts with sunlight.

Overall, the response demonstrates a limited understanding of the parts of a plant and how they function to help the plant survive.

ANNOTATED STUDENT RESPONSE
Grade 4 Science

Sample 1-Point Response of Student Work

Student Response

Two of its parts are root and roses. Roses make it pretty and roots helps makes it grow.

The student identifies two parts of the rose plant (i.e., roots and roses/flowers) and attempts to explain the functions of the plant parts. The explanations show very little understanding of how plant parts function.

Overall, the response demonstrates a minimal understanding of the parts of a plant and how they function to help the plant survive.

INSTRUCTIONAL STRATEGIES
Grade 4 Science

The open response item **"Plant Parts"** was designed to assess students' ability to (1) describe parts of a familiar plant either from prior knowledge or from the picture provided in the prompt and (2) explain how each of the parts functions to help the plant survive. Key words protection, water, reproduction, energy, and photosynthesis were given in the prompt to suggest that a high level of thinking about function was expected. The instructional strategies below present ideas for helping students explore and master these concepts and skills.

Discuss the following concepts and skills with students:

- All parts of living organisms have specific functions that assist growth and survival.
- Organisms have basic needs and can only survive if these needs are met.
- Careful observation and description are important for communication among scientists and others.
- Descriptions can include written sentences as well as accurate and labeled drawings.

Have students work individually, in pairs, in small groups, and/or as a class to complete any or all of the following activities:

- Obtain fresh plants with roots, stem, leaves, and flowers. Give each member of the class a different plant. Have students draw and describe their plant's parts in writing. The plants can then be mixed up and members of the class can try to match the plants with their descriptions.
- Grow plants from seeds until they flower and form new seeds, using a method that allows students to observe root growth. Have students create drawings and written descriptions to show key stages in the development of the plant.
- Observe classroom animals from birth to adult, with each student group adopting an animal. Have students keep journals that document the growth of their animals and how the animals use their various structures to grow and survive.
- Prepare a poster that shows how a plant or animal can be divided into functional structures/systems and explains what each structure/system does to help the organism survive.